

REMARKS

This Amendment is in response to the Official Action mailed December 18, 2002.

Claims 1, 2, 4, 12-16, 28, 32, and 33 remain in the application. Claims 5-7 and 29-31 have been canceled without prejudice. Independent claims 1 and 12 have been amended to incorporate a limitation that was substantively presented in claim 7. Independent claim 28 has been amended to incorporate a limitation that was substantively presented in claim 31. No new subject matter has been added with these amendments.

A. 35 U.S.C. 102(b)

Claim 28 stands rejected under 35 U.S.C. § 102(b) as being obvious over U.S. Patent No. 5,812,378 issued September 22, 1998 to Joseph Fjelstad, et al. (hereinafter "the Fjelstad patent") (Office Action, page 2).

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claim 28 has been amended to more clearly define the present invention with the inclusion of the limitation of "wherein said conductive material forms a semispherical surface which substantially conforms to the surface of said solder ball". The substance of this limitation was presented in claim 31.

The Fjelstad patent illustrates a conductive material having projections 42 over a hole 36

in a substrate. However, the Fjelstad patent does not teach that the conductive material forming a semispherical surface which substantially conforms to the surface of the solder ball. At best, the projections 42 merely bend and make contact with the bump lead 70, during insertion and retention (i.e., FIG. 5 and 6). Thus, it is clear that projections 42 do not form a semispherical surface.

Thus, as the Fjelstad patent does not teach or suggest all of the limitations of the present claims, reconsideration and withdrawal of the Section 102(b) rejection of claim 28 are respectfully requested.

B. 35 U.S.C. § 103(a)

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claims 1, 2, 4-7, and 29-31 – the Buschbom patent in view of the Hembree et al. patent, the APA, and the Scholz patent

Claims 1, 2, 4-7, and 29-31 stand rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 5,834,335 issued November 10, 1998 to Milton Buschbom (hereinafter "the Buschbom patent") in view of U.S. Patent No. 5,931,685 issued August 3, 1999 to Hembree,

Jacobson, Wark, Farnworth, Akram and Wood (hereinafter "the Hembree et al. patent"), the admitted prior art (hereinafter "APA"), and U.S. Patent No. 5,329,423 issued July 12, 1994 to Kenneth Scholz (hereinafter "the Scholz patent") (Office Action, pages 3-9).

Claim 1 (from which claims 2 and 4-7 depend) has been amended to include the substance of the limitations in claim 7, wherein at least one of the at least one substrate contact and the at least one motherboard contact is recessed and has a semispherical surface which is substantially the same radius as a radius of said solder ball. Claims 5-7 and 29-31 have been canceled without prejudice.

With regard to the limitation of claim 7, the Office Action has shown no teaching or suggestion in any of the references of a recessed motherboard contact having a semispherical surface which is substantially the same radius as a radius of said solder ball. It is noted that the Office Action at page 5 refers to the Hembree et al. patent teaching selecting size, shape (circular, oval, square, etc.), dimensions, etc. However, this is not a teaching of matching the radius of the solder ball with a semispherical contact.

Further, the only motivation that the Office provides at page 6 for the combination of these references is "to improve the surface connection, reliability, and bonding strength". This motivation is unclear. "Bonding strength" is not a concern in the present invention, as the invention related to a non-reflow contact. Thus, there has been no relevant motivation given by the Office with regard to the combination of the references. Therefore, the Office has failed to "present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references", as set forth in M.P.E.P. 706.02(j).

Thus, for the reasons stated above, reconsideration and withdrawal of the Section 103(a) rejection of claims 1, 2, and 4 (claims 5-7 and 29-31 having been canceled) are respectfully requested.

Claims 12-16 – the Buschbom patent in view of the Hembree et al. patent, the APA, the Scholz patent, the Hembree patent, the Domadia patent, and the Gililand

Claims 12-16 stand rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 5,834,335 issued November 10, 1998 to Milton Buschbom (hereinafter “the Buschbom patent”) in view of U.S. Patent No. 5,931,685 issued August 3, 1999 to Hembree, Jacobson, Wark, Farnworth, Akram and Wood (hereinafter “the Hembree et al. patent”), the admitted prior art (hereinafter “APA”), U.S. Patent No. 5,329,423 issued July 12, 1994 to Kenneth Scholz (hereinafter “the Scholz patent”), U.S. Patent No. 5,783,461 issued July 21, 1998 to David Hembree (hereinafter “the Hembree patent”), U.S. 5,949,137 to Domadia et al. (hereinafter “the Domadia patent”), and U.S. Patent 6,137,161 issued October 24, 2000 to Gililand et al. (hereinafter “the Gililand patent”) (Office Action, pages 7-9).

Independent claim 12 has been amended to include the substance of the limitation of claim 7, wherein wherein at least one of the at least one substrate contact and the at least one motherboard contact is recessed and has a semispherical surface which is substantially the same radius as a radius of said solder ball. As previously stated, with regard to the limitation of claim 7, the Office Action has shown no teaching or suggestion in any of the references of a recessed motherboard contact having a semispherical surface which is substantially the same radius as a radius of said solder ball.

Thus, as none of the references teach or suggest all of the limitations of the present claims, reconsideration and withdrawal of the Section 103(a) rejection of claims 12-16 are respectfully requested.

Claims 32 and 33

Claims 32 and 33 stand rejected under 35 U.S.C. § 103(a) as being obvious over the Hembree et al. patent in view of the Scholz patent (Office Action, page 10-12).

With regard to claims 32 and 33, the Office Action correct states that the Hembree et al. patent does not teach or suggest a contact with a semispherical surface which is substantially the same radius as a radius of the solder. However, to overcome this lack of teaching or suggestion, the Office Action merely states that the arrangement claimed would be a matter of design. However, this statement is insufficient. As set forth in MPEP “The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.” *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Therefore, this argument is without merit.

Furthermore, the Office Action contends that the Scholz patent teaches “recesses having semispherical or trapezoidal shape are dimensioned to fit the radius/curvature of the tip portion of the contact bumps.” This is a strained argument at best. The Scholz patent shows contact bumps with curved edges, not a solder ball as claimed in the present claims. Further, the Scholz patent merely shows a trapezoidal shape, which is deformed by the curved edges of contact bumps, not semispherical, as claimed in the present claims.

Thus, as neither the Hembree et al. patent nor the Scholz patent teach or suggest all of the limitations of the present claims, reconsideration and withdrawal of the Section 103(a) rejection of independent claims 32 and 33 are respectfully requested.

In view of the foregoing remarks, the Applicants request favorable reconsideration and allowance of the application.

Please forward further communications to the address of record. If the Examiner needs to contact the below-signed attorney to further the prosecution of the application, the contact number is (208) 433-9217.

Respectfully submitted,



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VERSION OF CLAIMS WITH MARKINGS:IN THE CLAIMS:

1. (Second Amended) A microelectronic component assembly, comprising:

a substrate having at least one contact;

a motherboard having at least one contact;

at least one solder ball extending between said at least one substrate contact and said at least one motherboard contact, wherein said at least one solder ball is attached to one of said at least one substrate contact and said at least one motherboard contact;

wherein said at least one of said at least one substrate contact and said at least one motherboard contact is recessed and has a semispherical surface which is substantially the same radius as a radius of said solder ball; and

a compression mechanism for imparting pressure between said substrate and said motherboard.

12. (Second Amended) A microelectronic component assembly, comprising:

a substrate having a first surface and a second surface, wherein said first substrate first surface includes at least one contact;

a motherboard having a first surface and a second surface; wherein said motherboard first surface includes at least one contact;

at least one solder ball extending between said at least one substrate first surface contact and said at least one motherboard first surface contact, wherein said at least one solder ball is

attached to one of said at least one substrate first surface contact and said at least one motherboard first surface contact;

wherein said at least one of said at least one substrate contact and at least one motherboard contact is recessed and has a semispherical surface which is substantially the same radius as a radius of said solder ball; and

a support structure for imparting pressure between said substrate and said motherboard.

28. (Second Amended) A substrate contact for forming a non-reflow electrical contact with a solder ball, comprising:

a recess defined in a substrate by at least one surface extending into said substrate; and  
a conductive material layered over said recess forming a void therebetween, wherein said conductive material forms a semispherical surface which substantially conforms to the surface of said solder ball.